Space Weather Forecast

Issued on Sunday, 21 July 2024 at 13:02 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate-class X-ray flares likely. Chance of G1 Minor Geomagnetic Storms peaking Day 3 (23 July).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has remained Moderate, with occasional low-level Moderate-class flares from a dynamic sunspot region in the northwest and a third from a large spot near the middle of the Sun, peaking near the same intensity at 20/1849UTC, 21/0355UTC and the third at 21/0834UTC. The sunspot group responsible for much of the activity became increasingly difficult to classify, however there has been lot of movement and shear in this group, which may go some way to explaining its recent activity, despite apparently not being the most complex group on the Sun.

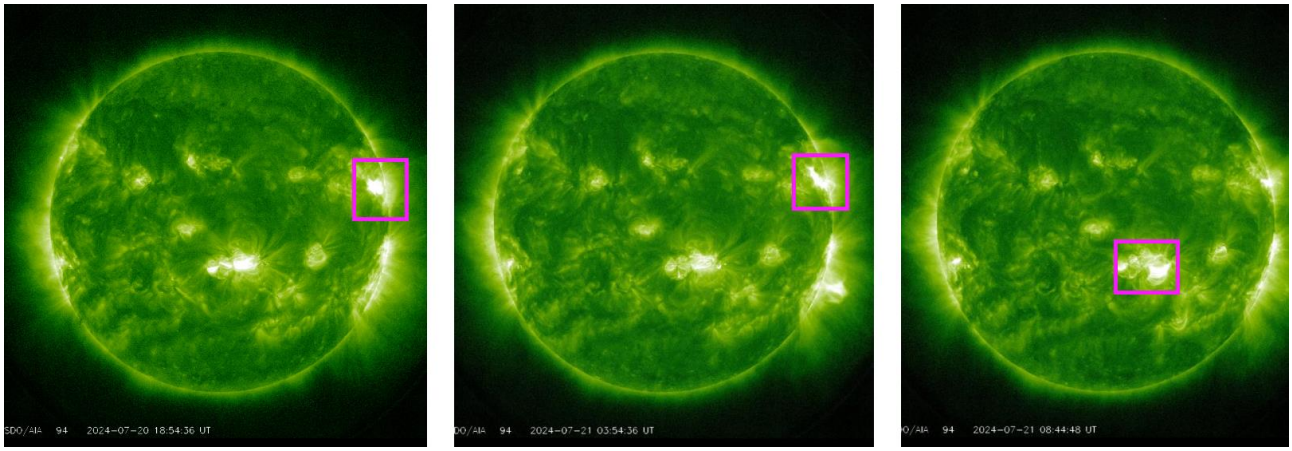

Figure 1: False-colour extreme UV imagery showing the source regions for the three Moderate-class X-ray flares of the period, respectively two from a region in the northwest and the third from nearer the middle of the Sun. At the time of writing only the middle event was confirmed as having generated any CME, albeit not Earth-directed in this case.

There are currently up to eleven sunspot regions on the facing side. The main changes in the period have included emergence of further trailing spots in the largest region near the middle of the Sun. To its immediate east, a second recently-emerged region showed spreading and emergence of spots.

There was no evidence of Earth-directed Coronal Mass Ejections (CMEs) in the period. Satellite imagery shows faint ejecta directed to the far southeast from a 'prominence eruption' here (arc of plasma leaving the Sun's edge) around the turn of the current UTC day, and also ejecta heading well westward from the most active sunspot region from its 21/0355UTC X-ray flare. Other minor activity is currently thought to have originated from behind the solar horizon(s), all to no effect on the forecast.

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Solar Wind / Geomagnetic Activity: The solar wind showed a continuation of a slow regime. The speed, number of particles and their associated magnetic field were all within normal background ranges. The net result of the above solar wind measures was for provisionally mainly quiet geomagnetic indices.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is likely throughout, perhaps falling slightly into day three (23 July) as the most active region of recent hours passes onto the Sun's far side.

Solar Wind /Geomagnetic Activity: One CME from 19 July - a south central 'filament eruption' - now features in the forecast, giving a peak chance of Minor Geomagnetic Storm G1 conditions on day three, Tuesday 23 July. No fast winds feature, and activity should otherwise remain quiet throughout.

Energetic Particles / Solar Radiation: The chances of solar radiation storms breaching S1 Minor levels show a daily slight chance in the period in response to any suitable X-ray flares, chiefly those emitted from the better-connecting western solar horizon.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	40	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	Yes	70	70	60	60
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	10	15	15	15
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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